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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,330	03/30/2004	Jong-myeong Lee	5649-1205	5124
20792	7590	05/02/2005	EXAMINER	
MYERS BIGEL SIBLEY & SAJOVEC			EVERHART, CARIDAD	
PO BOX 37428			ART UNIT	
RALEIGH, NC 27627			PAPER NUMBER	

2891  
DATE MAILED: 05/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/813,330

**Applicant(s)**

LEE ET AL.

**Examiner**

Caridad M. Everhart

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 2-9-05
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19 and 20 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6 and 13-17 is/are rejected.
- 7) ☒ Claim(s) 2,5 and 7-12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2-25-05</u> | 6) <input type="checkbox"/> Other: _____  |

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Applicant's arguments with respect to claims 1, 3, 4, 6, and 13-18 have been considered but are moot in view of the new ground(s) of rejection.

Applicant has amended the claims to include the limitation "an oxide layer included in" after the recitation "to expose an upper surface".

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 4, 6, 13, 14, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanahashi (US 6,064,084).

Tanahashi discloses the steps of removing the barrier outside of a damascene pattern(Fig. 7C shows the barrier 84 removed from the surface of layer 82), which is the same as an intaglio pattern, and the layer in which the damascene pattern is formed is an oxide layer(col. 12, lines 55-59 disclose that the interlayer insulation film in the embodiments is SiO<sub>2</sub>), while leaving the barrier inside the damascene pattern(Fig. 7C), forming a conductive layer on the damascene pattern(col. 15, lines 1-3 indicate that the further steps would follow the other embodiments, which include filling with conductor, as in col. 12, lines 25-30), and removing the conductive layer from the upper surface of the oxide layer(Fig. 4L shows conductive layer 38, and Fig. 4M shows the conductive

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layer removed from the surface of the oxide layer; since it is disclosed by Tanahashi that the embodiment in Fig. 7C would also follow these steps, the conductor would also be deposited to fill the opening in Fig. 7C and would also be removed from the surface of the oxide in Fig. 7C). In Fig. 7B and Fig. 7C it is seen that there are formed a hole and a groove at the top of the hole. The conductive layer is formed in the hole and in the groove. The bit line pattern taught by Tanahashi is polysilicon, but may be replaced by other conductor which includes a barrier layer which includes TiN(col. 12, lines 55-60). The planarization is performed using CMP(col. 14, lines 57-58). The metal fill may be aluminum(col. 9, lines 62-67 and col. 10, lines 1-3). The conductor is deposited by CVD(col. 3, lines 30-34), as the conductive film is deposited by CVD, and Tanahashi discloses that aluminum may be used instead of polysilicon

***Claim Rejections - 35 USC § 103***

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanahashi as applied to claim 14 above further in view of Doan, et al.

Tanahashi is silent with respect to the reflow step.

Doan, et al discloses that reflow of the aluminum fill layer results in improved fill(page 199).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the step taught by Doan, et al with the process taught by Tanahashi in order to obtain improved fill of the damascene structure.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanahashi in view of Ono, et al.

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Tanahashi is silent with respect to the conductor comprising copper, although Tanahashi discloses that other conductors can be used, as cited above.

Ono et al discloses that alloys of aluminum can be used in the fill of contact openings and one of the alloys comprises copper (page 77, next to the last paragraph).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used conductor that comprises copper in the method taught by Tanahashi in order to improve the reflow properties of the conductor layer.

***Allowable Subject Matter***

Claims 2,5,7-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 19 and 20 are allowed.

Applicant's amendment made the new grounds of rejection necessary, therefore,

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart  
4-27-2005

*C. Everhart*  
CARIDAD EVERHART  
PRIMARY EXAMINER